Innovations for Defence Excellence

Why in News?

Innovations for Defence Excellence (iDEX), the flagship initiative of the Ministry of Defence, has signed its 250th contract – first under **Mission DefSpace** – and 100th **SPRINT (Navy)** contract.

What are Mission DefSpace and SPRINT Navy Contracts?

- **Mission DefSPace Contract:**
  - Space startup InspeCity has been awarded the **first iDEX contract of Mission DefSpace.**
  - InspeCity had emerged as the winner of a challenge conducted by the Defence Space Agency focused on developing a gas based **Micropropulsion system for cubesats.**
    - Cubesats are a class of small satellites and are easy to manufacture, modular, modular, low cost, integrate and launch. The cubesats are critical for **launch-on-demand capabilities and are good for Imagery, Reconnaissance/communication,** and also Intelligence Surveillance.
  - This technology will enable **precise manoeuvring and orbit correction for satellites,** including the cubesat swarm being developed under Mission DefSpace.
- **SPRINT (Navy) Contract:**
  - Siliconia Technologies Pvt Ltd, has emerged as the winner of a **SPRINT (Supporting Pole-Vaulting in R&D through iDEX, NIIO and TDAC)** Challenge focused on developing a **lightweight Application-Specific Integrated Circuit (ASIC)** based communication system for phased-array radars.
  - The system provides **multiple independent receiver/transmitter sources** crucial for satellite tracking.
  - It utilizes software-defined antennas for communication with Low Earth Orbit (LEO)**, Medium Earth Orbit,** and **Geostationary Satellites.**

What is iDEX?

- **About:**
  - iDEX, launched in 2018, is an **ecosystem to foster innovation & technology development in Defence and Aerospace** by engaging innovators & entrepreneurs to deliver technologically advanced solutions for modernizing the Indian Military.
  - It provides funding/grants to **Micro Small and Medium Enterprises (MSMEs), start-ups**, individual innovators, R&D (Research and Developments) institutes and academia to carry out research and development.
  - The iDEX-Prime aims to support projects requiring support beyond **Rs 1.5 crore up to Rs 10 crore, to help ever-growing start-ups** in the defence sector.
    - **iDEX portal** was launched to provide wider publicity and better visibility of iDEX activities and enable more efficient running of future challenges through better information management.
- **Objectives:**
  - **Indigenization:** Rapid development of **new, indigenized and innovative** technology.
  - Innovation: Creates a **culture of engagement with innovative startups** to encourage co-creation.
- **Funding:**

    - iDEX is funded and managed by **"Defence Innovation Organisation (DIO)".**
    - iDEX will function as the **executive arm of DIO**, carrying out all the required activities while DIO will provide high level policy guidance to iDEX.
- **Achievement:**
    - iDEX has been awarded the prestigious Prime Minister Award for Public Policy in Innovation Category for the year 2021.

What is Mision DefSpace?

- It was inaugurated by Prime Minister of India during the October 2022 edition of India's DefExpo.
- It aims to **nurture the Indian Private Space industry through challenges addressing every stage** of a space mission – from mission planning to satellite data analytics.
- This mission encompasses **75 Defense Space Challenges that directly suit the needs of end users.**
- These challenges have been categorised into the existing **DDP initiatives of iDEX, Make-I, and Make-2**, allowing participation from private industries, including startups, MSMEs, and individual innovators.
- The challenges are categorized into **five different domains:**
    - Launch System
    - Satellite System
    - Communication & Payload System
    - Ground System, and Software System.
        - Together, they offer an in-depth and complete understanding of space from a 360-degree perspective.

What are Government Initiatives Regarding Defense?

- **First Negative Indigenisation**
- **Positive Indigenisation List**
- **New FDI Policy in Defence Sector**
- **Defence Acquisition Procedure 2020**
- **Defence Industrial Corridors**

Source: ET

India's Fisheries Sector

For Prelims: Sagar Parikrama, Pradhan Mantri Matsya Sampada Yojana, Kisan Credit Card, Indian Blue Revolution, GPS Navigation systems, Palk Bay Scheme, Fisheries and Aquaculture Infrastructure Development Fund (FIDF), Aquaponics

For Mains: Status of the Fisheries Sector in India.

Why in News?

Government's Sagar Parikrama is an **evolutionary journey** envisaged in the sea across the coastal belt aiming to resolve the issues of the fishermen and other stakeholders and facilitate their economic

upliftment through various government schemes and programs, including **PMMSY (**Pradhan Mantri Matsya Sampada Yojana**) and KCC (**Kisan Credit Card**).**

What is the Sagar Parikrama Initiative?

- **About:**
  - **Sagar Parikrama**' program envisages to cover the maritime States/UTs in a phased manner. **The journey began on March 5th, 2022,** from **Mandvi, Gujarat.**
  - The journey focuses on bridging the gaps in the expectations of fisher communities, developing **fishing villages, and upgrading infrastructure such as** fishing harbors **and fish landing centers.**
- **Phases of Sagar Parikrama:**
  - **Phase I:** The journey covered three locations in **Gujarat - Mandavi, Okha-Dwarka, and Porbandar.**
  - **Phase II:** Seven locations were covered in **Mangrol, Veraval, Diu, Jafrabad, Surat, Daman, and Valsad.**
  - **Phase III:** Coastal areas of northern **Maharashtra, including Satpati, Vasai, Versova, New Ferry Wharf (Bhaucha Dhakka), and Sasson Dock in Mumbai,** were part of this phase.
  - **Phase IV: Udupi and Dakshina Kannada** districts in Karnataka were covered during this phase.
  - **Upcoming Phase V:** Phase V of Sagar Parikrama will cover six locations: Raigad, **Ratnagiri, and Sindhudurg Districts in Maharashtra, and Vasco, Maorugoa, and Canacona in Goa.**
    - Maharashtra, with its extensive coastline of **720 km,** has immense **untapped potential in the** fisheries sector.
    - The state ranks **7th in fish production in the country,** with marine fisheries contributing **82% and inland fisheries 18%.**
    - **Goa, with a coastline of 104 km**, also plays a vital role in the marine fishery sector, providing livelihoods to many.

What is the Status of the Fisheries Sector in India?

- **About:**
  - As the **third-largest fish producer** and the **second-largest aquaculture producer** globally, India recognizes the significance of the fisheries and aquaculture industry.
  - The **Indian Blue Revolution** has led to a major improvement in the fishing and aquaculture industries. The industries are regarded as **sunrise sectors** and are anticipated to have a big impact on the Indian economy.
  - In the recent past, Indian fisheries has witnessed a paradigm shift **from marine dominated fisheries to inland fisheries**, with the latter emerging as a major contributor of fish production from **36% in the mid-1980 to 70% in the recent past.**
  - The fish production reached an **all-time high of 16.25 MMT during FY 2021-22 with** marine exports **touching Rs. 57,586 Crores.**
- **Top Producing States:**
  - **Andhra Pradesh is the largest producer of fish in India** followed by West Bengal.

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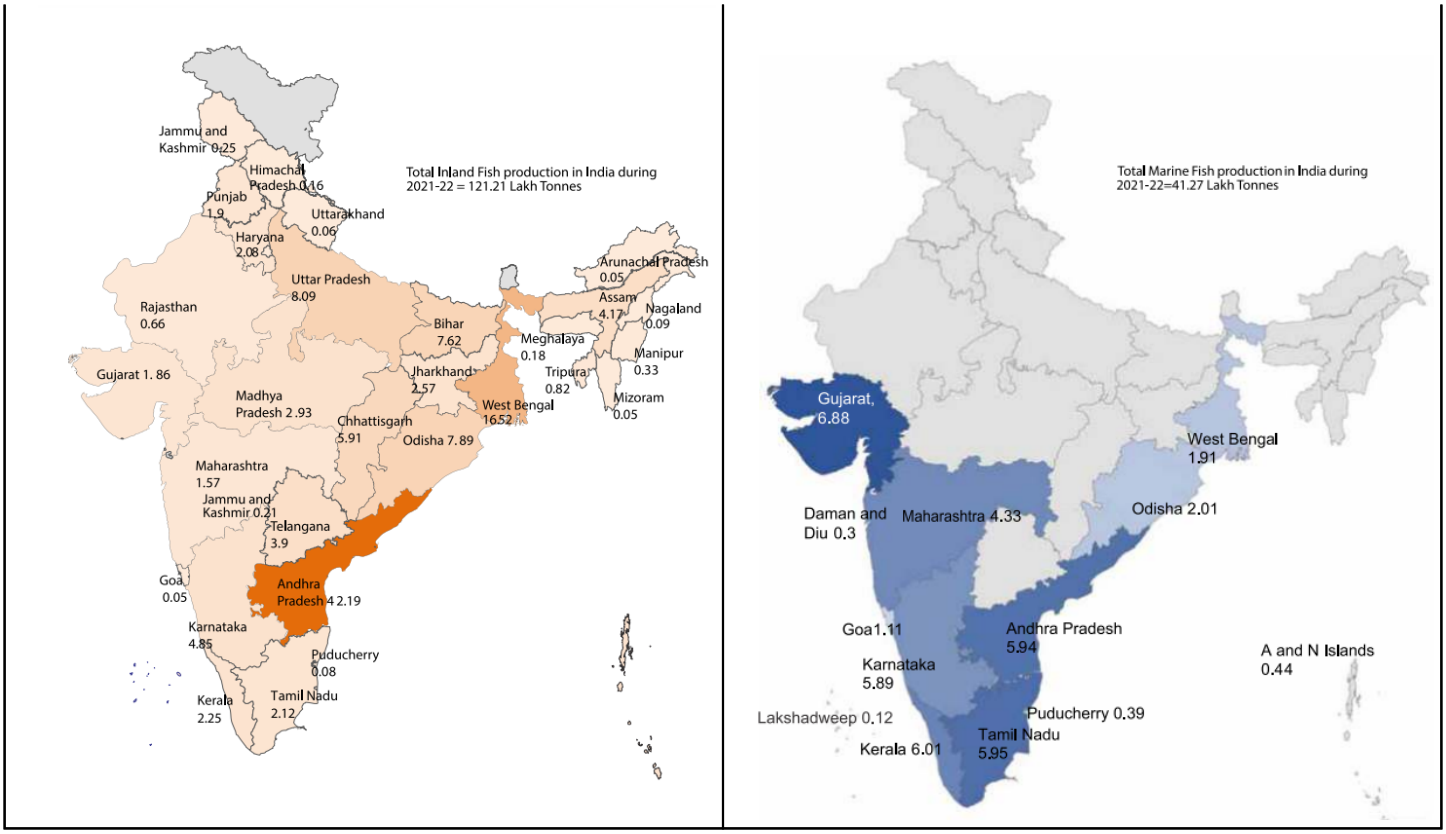

- **Current Challenges:**
  - **Illegal, Unreported, and Unregulated (IUU) fishing:** IUU fishing exacerbates overfishing and undermines the sustainability of the sector.
    - IUU fishing involves activities such as **fishing without proper licenses, using banned gear, and disregarding catch limits.** Weak monitoring and surveillance systems make it difficult to combat this problem effectively.
  - **Inadequate Infrastructure and Technology: Outdated fishing vessels, gear, and processing facilities hinder the efficiency and productivity of the sector.** Insufficient cold storage and transportation infrastructure result in post-harvest losses.
    - Limited access to modern fishing technology, such as **fish finders and** GPS navigation systems**,** restricts the ability to locate fish stocks accurately.
  - **Climate Change and Environmental Degradation:** Rising sea temperatures, ocean acidification, and changing currents have a profound impact on marine ecosystems and fish populations.
    - Climate change leads to shifts in **fish distribution, reduced productivity, and increased vulnerability to diseases.** Pollution, habitat destruction, and coastal development further degrade marine ecosystems.
  - **Socio-Economic Issues:** The fisheries sector in India is characterized by a large number of **small-scale and artisanal fishers** who face multiple socio-economic challenges.
    - **Low incomes, lack of access to credit and insurance, and inadequate social security measures** contribute to the vulnerability of fishing communities.
    - **Gender disparities** and the marginalization of women in fisheries also pose challenges.
  - **Market Access and Value Chain Inefficiencies:** Despite India's significant fish production, there are challenges in accessing **domestic and international markets.**
    - **Poor** post-harvest handling**, limited value addition, and inadequate market linkages** result in reduced profitability for fishers.
- **Initiatives related to Fisheries Sector:**
  - **Pradhan Mantri Matsya Sampada Yojana**
  - **Palk Bay Scheme**
  - **Fisheries and Aquaculture Infrastructure Development Fund (FIDF)**

Way Forward

- **Embrace Aquaponics:** India can **promote the adoption of** aquaponics, a **sustainable farming technique** that combines fish farming with hydroponics.
    - This system allows for the **simultaneous cultivation of fish and plants, utilizing fish waste as a nutrient source for plant growth.**
    - **Aquaponics reduces water usage, maximizes land productivity,** and provides an additional source of income for fish farmers.
- **Enhance Cold Chain Infrastructure**: There is a need to improve the **cold chain infrastructure to minimize post-harvest losses** and maintain the quality of fish products.
    - Also, there is a need to establish **well-equipped fish collection centers near coastal areas and integrate them with modern storage facilities,** transportation systems, and processing units.
    - This will enable the efficient preservation and distribution of fish, **reducing spoilage and increasing market value.**
- **Support Value Addition and Diversification:** Encourage fish farmers to engage in value addition activities to increase their income. Provide training and financial assistance for **fish processing, packaging, and branding.**
    - Promote the development of innovative fish-based products such as **ready-to-eat snacks, fish oil supplements, fish leather, and collagen products.** This will expand market opportunities and enhance the value chain.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. Under the Kisan Credit Card scheme, short-term credit support is given to farmers for which of the following purposes? (2020)

1. Working capital for maintenance of farm assets
2. Purchase of combine harvesters, tractors and mini trucks
3. Consumption requirements of farm households
4. Post-harvest expenses
5. Construction of family house and setting up of village cold storage facility

Select the correct answer using the code given below:

(a) 1, 2 and 5 only
(b) 1, 3 and 4 only
(c) 2, 3, 4 and 5 only
(d) 1, 2, 3, 4 and 5

Ans: (b)

Mains

Q. Defining blue revolution, explain the problems and strategies for pisciculture development in India. **(2018)**

Source: PIB

Sea Butterflies

For Prelims: Sea Butterflies, **Ocean acidification**

For Mains: Impact of climate change on marine ecosystems, Ocean acidification

Why in News?

The population of the sea butterflies in the Southern Ocean is shrinking due to climate change, making them extremely vulnerable.

What are Sea Butterflies?

- **About:**
  - Sea butterflies, scientific name Thecosomata, are a **suborder of sea snails** known as **shelled pteropods**.
  - They have **muscular feet that allow them to swim in water** instead of gliding on solid surfaces.
  - Sea butterflies are **holoplanktonic** (organisms that pass their whole life floating, drifting, or swimming weakly in the water) and spend their entire life cycle in the water column.
  - They are **found in all oceans** but are more diverse and **abundant in colder waters.**
  - Sea butterflies have **bilateral symmetry** and a **coiled or uncoiled shell** of various shapes and sizes.
    - **Their shell** is mostly transparent and very fragile and **can be easily dissolved by ocean acidification.**
  - They have a pair of wing-like lobes or parapodia for propulsion and a head with eyes, tentacles, and a mouth with a long proboscis to capture prey.
  - They have a reduced or absent gill and rely on their body surface for gas exchange.

- **Importance:**
  - They are a major **food source** for many fish, seabirds, whales, and other marine animals.
  - They also play a key role in **transporting carbon from the surface to the deep ocean through their shells and fecal pellets.**

How does Climate Change Impact the Population of Sea Butterflies?

- **Ocean Acidification:**

        - Increased **carbon dioxide absorption by the ocean leads to higher acidity.**
        - **Reduced availability of carbonate ions** necessary for shell formation and maintenance.
        - The ocean is the **most acidic in winter** because **cooler water absorbs more CO_2.** This means, the winter months are the most dangerous for the shelled sea butterflies.
            - Sea butterflies' shells can dissolve, weaken, or deform.
            - Increased vulnerability to predators, infections, and stress.
            - Affects metabolism, growth, reproduction, and survival.
    - **Ocean Warming:**
        - **Rising ocean temperatures** due to climate change.
        - Changes in distribution and abundance of sea butterflies.
        - Seek optimal thermal conditions for development and survival.
        - Alters **food availability and quality.**
        - Impacts **ocean currents and mixing affecting sea butterfly transport.**
    - **Ocean Deoxygenation:**
        - Warmer and stratified ocean leads to decreased oxygen levels.
        - Affects **sea butterflies' respiration and energy balance.**
        - **Alters vertical migration patterns.**
        - Exacerbates effects of ocean acidification by increasing dissolved carbon dioxide concentrations.

How can this Reduced Population Impact Antarctic Marine Ecosystems?

- **Reducing the Food Availability for Higher Trophic Levels:**
    - Sea butterflies serve as a major food source for fish, seabirds, whales, and other marine animals.
        - Population decline of sea butterflies can lead to starvation, malnutrition, or reduced reproduction in their predators and prey.
- **Disrupting the Balance of the Marine Food Web:**
    - Sea butterflies play a crucial role in linking **primary producers (phytoplankton) with secondary consumers (zooplankton)** and higher trophic levels.
    - Decline in sea butterfly population can alter the structure and function of the marine food web.
    - Biodiversity and productivity of the Antarctic marine ecosystem may be affected.
- **Decreasing the Carbon Sequestration Capacity of the Ocean:**
    - Sea butterflies contribute to the **"biological pump,"** transporting carbon from the surface to the deep ocean through their shells and fecal pellets.
    - Population decline **reduces the amount of carbon sequestered (process of capturing and storing atmospheric carbon dioxide)** in the ocean.
    - This results in increased carbon dioxide in the atmosphere and further ocean acidification.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. The acidification of oceans is increasing. Why is this phenomenon a cause of concern? (2012)

1. The growth and survival of calcareous phytoplankton will be adversely affected.
2. The growth and survival of coral reefs will be adversely affected.
3. The survival of some animals that have phytoplanktonic larvae will be adversely affected.
4. The cloud seeding and formation of clouds will be adversely affected.

Which of the statements given above is/are correct?

(a) 1, 2 and 3 only
(b) 2 only
(c) 1 and 3 only
(d) 1, 2, 3 and 4

Ans: (a)

Mains

Q. Assess the impact of global warming on the coral life system with examples. **(2019)**

Source: DTE
